

**REMARKS**

Claims 1, 2, 4-8 and 10-14 are pending in this application. By this Amendment, claims 1 and 6 are amended. Support for the amendments to the claims may be found, for example, in the specification at page 14, lines 5-7 and page 17, lines 15-21. No new matter is added.

In view of the following remarks, reconsideration and allowance are respectfully requested.

**I. Rejection Under 35 U.S.C. §112**

The Office Action rejects claims 1, 2, 4, and 5 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Page 2 of the Advisory Action indicates that the 35 U.S.C. §112 rejections have been overcome in view of the response filed January 5, 2009. Accordingly, the rejection is not addressed substantively in the present response.

**II. Rejections Under 35 U.S.C. §103**

The Office Action rejects claims 1, 2, 4-6, 13 and 14 under 35 U.S.C. §103(a) over U.S. Patent No. 5,863,850 to Nawa et al. (hereinafter "Nawa") in view of U.S. Patent No. 5,023,071 to Sherif (hereinafter "Sherif") and further in view of U.S. Patent No. 5,670,088 to Chittofrati et al. (hereinafter "Chittofrati"); and rejects claims 7, 8, and 10-12 under 35 U.S.C. §103(a) over Nawa in view of Sherif further in view of Chittofrati and further in view of U.S. Patent Application Publication No. 2002/0061816 to Uenishi et al. (hereinafter "Uenishi").

Applicant respectfully traverses the rejections.

By this Amendment, claim 1 is amended to more clearly distinguish over the applied references. Specifically, claim 1 is amended to recite in-part (emphasis added):

...contacting an organic phase having dissolved therein an organic compound of a metal alkoxide or an acetonate-metal complex, the metal of said metal alkoxide or acetonate-metal complex being

hereinafter referred to as a first element, with an aqueous phase containing a second element as an ion, in a form of a microemulsion containing a surfactant, in which a hydroxide of said first element is produced by a hydrolysis reaction of said organic compound at the interface between said organic and aqueous phases while incorporating said second element in the product,  
adding an alkali to the microemulsion to adjust the pH for colloid aggregation adjustment and maturing, and...

The applied references disclose no such combination of features or establish any reason or rationale to provide such a combination of features. Claim 6 recites similar features and is patentable for similar reasons as discussed in connection with claim 1.

Nawa discloses that an aqueous solution including zirconium and cerium salts is mixed with an organic solution of an alkoxide of titanium to obtain a mixed solution, which is hydrolyzed by adding an aqueous alkali solution thereto, to thereby generate a precipitate (partially stabilized zirconia containing CeO<sub>2</sub> and TiO<sub>2</sub>). See Nawa, col. 6, lines 40-47. However, Nawa is only a co-precipitation, and is different from the method of claims 1 and 6 in that a microemulsion is not disclosed nor is there any reason or rationale to add an alkali to a microemulsion to adjust the pH for colloid aggregation adjustment and maturing.

The Office Action asserts that Nawa's disclosure meets the limitation wherein a water-in-oil emulsion or microemulsion system is used due to the explanation that mixing an organic phase with an aqueous phase will necessarily result in a microemulsion. See Office Action page 5. Applicant's respectfully submit that this allegation is not only lacking support in the art, it is technically inaccurate.

For example, as explained in the specification on page 6, line 34 to page 7, line 2, forming microemulsions requires a high water/surfactant molar ratio. The Office Action acknowledges that Nawa fails to teach the aqueous phase emulsified in the organic phase with a surfactant. See Office Action, page 6. Thus, the Patent Office's allegation lacks merit, as confirmed by the fact that the Patent Office has not cited any reference describing the mixing

of an organic phase with an aqueous phase that will necessarily result in a microemulsion, as recited in claims 1 and 6.

Accordingly, the rejection is improper, at least because the Office Action has failed to establish a proper *prima facie* case of obviousness. To the extent the assertions in the Office Action are based on official notice, such basis is not properly established and is thus improper.

With respect to Official Notice, the MPEP states that “such rejections should be judiciously applied” (see MPEP § 2144.03). “Official notice without documentary evidence to support an [E]xaminer’s conclusion is permissible only in some circumstances” (see MPEP § 2144.03(A)). “It would not be appropriate for the [E]xaminer to take official notice of facts without citing a prior art reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known” (see *Id.*, emphasis added).

Here, it is Applicant that has discovered that using microemulsions produces a homogenizing effect, firstly by speeding the hydrolysis rate due to the extremely small microemulsion size of from a few nanometers to ten or more nanometers and the very large oil phase/aqueous phase interface (about 8000 m<sup>2</sup>/liter with a 10 nm size) and secondly by division of the aqueous phase, which results in an extremely small number of metal ions (approximately 100) per droplet. See specification, page 9, lines 18-25. Nowhere do any of the references teach or suggest a process for production of compound oxide particles using a microemulsion containing a surfactant, in which a hydroxide of said first element is produced by a hydrolysis reaction of said organic compound at the interface between said organic and aqueous phases while incorporating said second element in the product and adding an alkali to the microemulsion to adjust the pH for colloid aggregation adjustment and maturing, as recited in claims 1 and 6, or the compound oxide particles have a composition that is uniform at the atomic level (as recited in claims 13 and 14).

The Office Action asserts Sherif and Chittofrati disclose a microemulsion. However, Sherif discloses adding water to an organic solution. This is a conventional metal alkoxide method in which water is added to a plurality of metal alkoxides and nothing more than that. Specifically, hydrolysis in Sherif is effected by adding water to an alkoxide containing a plurality of metal ions.

Sherif does not teach or render obvious or establish any reason or rationale to modify Nawa to provide a first element in an organic solution and a second element in an aqueous phase and that reacts at an interface between the organic and aqueous phases of a microemulsion or to add an alkali to a microemulsion to adjust the pH for colloid aggregation adjustment and maturing, as recited in claims 1 and 6, or to obtain a complex oxide with atom level uniformity as recited in claims 13 and 14.

Chittofrati discloses a microemulsion in which a surfactant is used, and an alkali is added thereto to form a compound metal oxide comprising metal elements that are derived from the aqueous and organic phases. However, the metal element in the organic phase forms a salt with the surfactant.

If the metal salt of a surfactant of Chittofrati, ferric perfluoroether monocarboxylate in the example, is added to an organic phase, when it contacts the aqueous phase, the salt is dissociated to release a metal ion ( $B^+$  ion) into the aqueous phase, and form an aqueous solution containing  $A^+$  ion that has originally existed prior to said contact in addition to  $B^+$  ion. In other words, the salt is dissociated at the time when it contacts with the dispersed aqueous phase and the metal ion ( $B^+$  ion) is incorporated in the aqueous phase, to form an aqueous solution in which an ion that has been present from the start in the water phase ( $A^+$  ion) as well as an ion that is newly incorporated ( $B^+$  ion) are co-present. Therefore, if an alkali is added, a compound metal oxide of  $A$  and  $B$  elements is formed by neutralization of  $A^+$  and  $B^+$  ions in the aqueous phase and, thus, aggregation adjustment is not necessary because the

reaction occurs in the aqueous phase, not at the interface between the aqueous and organic phases, as recited in claims 1 and 6.

Alternatively, if the timing of addition of an alkali is earlier, a reaction to produce a precipitation of A element first begins, followed by incorporation of B element into the precipitate, forming a final precipitate. This final precipitate may be a core/shell-type particle. Therefore, the uniformity of the compound metal oxide obtained in Chittofrati is considered to be not different from that of a compound metal oxide that is formed by a conventional co-precipitation method in which A and B elements are co-precipitated from an aqueous solution comprising A and B ions dissolved therein.

Accordingly, Chittofrati does not cure the deficiencies of Nawa and Sherif with respect to claims 1 and 6 because Chittofrati establishes no reason or rationale to provide a microemulsion containing a surfactant, in which a hydroxide of said first element is produced by a hydrolysis reaction of said organic compound at the interface between said organic and aqueous phases while incorporating said second element in the product nor is there any reason or rationale to add an alkali to the microemulsion to adjust the pH for colloid aggregation adjustment and maturing, as required by claims 1 and 6. Therefore, Nawa, Sherif and Chittofrati, considered either separately or combined, do not teach or suggest each and every element of claims 1 and 6 and, thus, would not have rendered obvious claims 1 and 6.

Furthermore, the combination of Nawa, Sherif and Chittofrati is based upon impermissible hindsight. At the time the invention was made, there would have been no reason or rationale for one of ordinary skill in the art to have combined Nawa, Sherif and Chittofrati. Nawa discloses a method of producing a metal oxide by co-precipitation, but does not provide any reason or rationale to use a microemulsion or suggest that the reaction occurs at the interface. Further, Sherif does not provide any reason or rationale to utilize a microemulsion. Sherif only states that a surfactant may be used and does not state any

conditions that would allow for the formation of a micoremulsion (i.e., a high water/surfactant molar ratio). Chittofrati discloses a microemulsion, but the reaction occurs in the aqueous phase, not at the interface between the aqueous and organic phases. Therefore, the Office Action combines the three references solely based on Applicants claims as a roadmap, which is clearly improper.

It is Applicant's disclosure that provides and claims a process for producing a compound metal oxide with an aqueous phase containing a second element as an ion, in a form of a microemulsion containing a surfactant, in which a hydroxide of said first element is produced by a hydrolysis reaction of said organic compound at the interface between said organic and aqueous phases while incorporating said second element in the product. Finally, none of the applied references establish any reason or rational to add an alkali to the microemulsion to adjust the pH for colloid aggregation adjustment and maturing. Therefore, the combination of Nawa, Sherif and Chittofrati is improper and, as a result, claims 1 and 6 would not have been rendered obvious by Nawa, Sherif and Chittofrati, alone or in combination.

For at least the foregoing reasons, Nawa, Sherif and Chittofrati would not have rendered obvious claims 1 and 6. Claims 2, 4, 5, 13 and 14 variously depend from claims 1 and 6 and, thus, also would not have been rendered obvious by the cited references.

Claims 7, 8, and 10-12 variously depend from either claim 1 or claim 6 and, thus, require all the limitations of either claim 1 or claim 6. Accordingly, the deficiencies of Nawa, Sherif and Chittofrati with respect to claims 1 and 6 are equally applicable to claims 7, 8, and 10-12.

Uenishi fails to cure the deficiencies of Nawa, Sherif and Chittofrati with respect to claims 1 and 6. Thus, Nawa, Sherif, Chittofrati and Uenishi, considered either separately or combined, do not teach or suggest each and every element of claims 1 and 6 and, thus, also would not have rendered obvious claims 7, 8, and 10-12.

Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

### **III. Conclusion**

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachments:

Request for Continued Examination  
Petition for Extension of Time

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